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ELECTRICAL TRANSMISSION

Description

The present invention relates to an electrical transmission having two generators which are coupled to the output shaft of an internal combustion engine via a step-up reduction gear operating as a transfer case.

In motor vehicles powered by an internal combustion engine the drive energy output by the internal combustion engine is initially transmitted to a differential transmission via a conventional automatic transmission and therefrom to the drive shaft.

In view of the increasingly strict emission regulations, it may become necessary for these vehicles, for example, city buses powered by internal combustion engines, to reduce harmful emissions.

An electrical transmission ~~according to the definition of the species of Claim 1~~ is described in German Patent 43 22 676 C2. The known electrical transmission has two generators coupled to the output shaft of an internal combustion engine via a step-up reduction gear acting as a transfer case. The step-up reduction gear is designed as a belt reduction gear, and the internal combustion engine transmits its drive power via a differential transmission.

Furthermore, U.S. Patent ~~Application 17 10 345 A~~ describes a motor vehicle in which two electrical traction motors are supplied with current from a generator referred to as a dynamo. Each traction motor is connected to a wheel to be driven via its own cardan shaft and its own differential.

Summary of The Invention

~~The~~ object of the present invention is to provide an electrical transmission having a compact design which can be substituted, in a simple manner, for an existing automatic transmission

in vehicles powered by internal combustion engines.

This object is achieved according to the present invention through the features of Claim 1. One advantageous embodiment of the present invention is described in Claim 2.

The electrical transmission according to Claim 1 has two generators coupled to the output shaft of an internal combustion engine via a step-up reduction gear operating as a transfer case. The electrical transmission according to Claim 1 includes, according to the present invention, the following additional features:

- the generators are arranged next to one another;
- two electrical traction motors arranged next to one another are arranged underneath or behind the generators;
- a step-down reduction gear is arranged downstream from the electrical traction motors as a summator gear train;
- the step-up transmission is integrated in a connecting flange between the internal combustion engine and the generators and;
- the dimensions of the electrical transmission are adapted to those of an automatic transmission to be replaced.

The electrical transmission according to the present invention has a compact design and can be substituted for an existing automatic transmission in a simple manner.

The electrical transmission according to the present invention thus allows existing vehicles powered by an internal combustion engine, in particular city buses powered by a diesel mechanical drive, to be inexpensively retrofitted by replacing the existing automatic transmission with the electrical transmission.

By replacing the automatic transmission with the electrical transmission according to the present invention, a city bus powered by a diesel electric drive is obtained in a simple manner. Compared to city buses powered by a diesel mechanical drive, such a city bus has a lower fuel consumption and considerably lower emission values, since the internal combustion engine can be operated in the optimum rpm range and its rpm is controlled continuously via the electrical traction motor. In conjunction with energy storage devices such as, for example, a

battery, fuel cell, or flywheel storage device, a low-emission or even an emission-free bus (hybrid bus) is obtained. The advantages of such hybrid vehicles are described, for example, in German Patent Application 41 33 013 A1.

Electrical transmissions according to the present invention may have a redundant power supply, since each generator can be activated via independent power electronics (rectifiers or converters). In addition, optimum adjustment to the required or desired drive power can be achieved in a simple manner. Furthermore, the individual generators can be driven with optimum efficiency by selectively turning at least one generator on or off.

In an embodiment according to ~~Claim 2,~~ the step-up reduction gear is designed as a gear transmission.

The invention is described in the following with reference to an embodiment schematically illustrated in the drawing.

Figure 1 shows a top view of an electrical transmission according to the present invention;

Figure 2 shows a bottom view an electrical transmission according to Figure 1.

Figures 1 and 2 show a first generator 1 and a second generator 2 which are coupled to a step-up reduction gear 5 via their generator shafts 3 and 4. Step-up reduction gear 5 is designed as a common transfer case and it is also coupled to a shaft 6 of an internal combustion engine 7.

The housings of generators 1 and 2 are connected to the housing of internal combustion engine 7 in a non-positive manner via a connecting flange 11.

According to the present invention, transfer case 5 is integrated in connecting flange 11.

The electrical energy generated by generators 1 and 2 is supplied to two electrical traction motors 8 and 9.

Both electrical traction motors 8 and 9 output the mechanical drive power generated via a

step-down reduction gear 10, which is designed as a common summator gear train.

As Figures 1 and 2 show, both electrical traction motors 8 and 9 are located below and behind generators 1 and 2.